

Application No. 10/808,665
Amendment Dated April 17, 2007
Reply to Office Action of January 17, 2007

Amendments to the Claims:

This listing of claims replaces all prior versions, and listing, of claims in the application:

Listing of Claims:

Claim 1 (original): An apparatus for measuring the refractive index of a substance, said apparatus comprising:

- a first lens;
- a second lens disposed opposite to the first lens along an optical axis;
- a gap between the first and second lenses, the gap adapted to receive the substance;
- a beam profiler disposed to receive light passed from the first lens through the gap and the second lens, and to measure a beam width of the received light; and
- a controller that estimates the refractive index of the substance from a measured beam width and a relationship between refractive index and beam width.

Claim 2 (original): The apparatus of claim 1, wherein light exiting the second lens has a converging section and a diverging section, the converging section being closer to the second lens than the diverging section, and wherein the beam profiler has an optical capture window that is positioned in the diverging section.

Claim 3 (original): The apparatus of Claim 1 further comprising a substrate, and
wherein the first lens comprises a planar spreading lens disposed on the substrate, the planar spreading lens having a first surface for receiving light and a second surface opposite to the first surface; and
wherein the second lens comprises a planar converging lens disposed on the substrate, the planar converging lens having a first surface facing the second surface of the planar spreading lens and a second surface opposite to the first surface.

Claim 4 (original): The apparatus of Claim 3 further comprising a waveguide disposed on the substrate to couple light to the first surface of the planar spreading lens.

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Claim 5 (original): The apparatus of Claim 3 further comprising a recess formed in the substrate, a first portion of the recess being disposed adjacent to the gap and a second portion being disposed under at least a portion of the gap.

Claim 6 (original): The apparatus of Claim 3 further comprising a fixture having a first retainer for holding the substrate and a second retainer for attaching to an optical capture element of the beam profiler.

Claim 7 (original): The apparatus of Claim 3 wherein the optical axis passes through the planar spreading lens and the planar converging lens, wherein the second surface of the planar spreading lens has a curvature that follows the contour of an ellipse, the ellipse having a first axis (P_s) that is parallel to the optical axis and a second axis (T_s) that is transverse to the optical axis.

Claim 8 (original): The apparatus of Claim 7 wherein the first axis is longer than the second axis.

Claim 9 (original): The apparatus of Claim 3 wherein the optical axis passes through the planar spreading lens and the planar converging lens, wherein the first surface of the planar converging lens has a curvature that follows the contour of an ellipse, the ellipse having a first axis (P_c) that is parallel to the optical axis and a second axis (T_c) that is transverse to the optical axis.

Claim 10 (original): The apparatus of Claim 9 wherein the first axis is longer than the second axis.

Claim 11 (original): The apparatus of Claim 3 further comprising a heater element disposed on at least one of the planar lenses, and a temperature sensor.

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Claim 12 (original): The apparatus of Claim 3 further comprising a heater element disposed in the gap, and a temperature sensor.

Claim 13 (original): The apparatus of Claim 3 further comprising a first electrode and a second electrode positioned to generate an electric field that passes through at least the gap.

Claim 14 (original): The apparatus of Claim 3 further comprising a coil that generates a magnetic field that passes through at least the gap.

Claim 15 (original): The apparatus of Claim 1 further comprising a first capillary guide disposed at an edge of the first lens, and a second capillary guide disposed at an edge of the second lens, the first and second capillary guides providing an opening for the substance which is wider than a distance between the first and second lenses.

Claim 16 (original): The apparatus of Claim 1 further comprising a source of heat and a temperature sensor.

Claims 17-26 (canceled)

Claim 27 (currently amended): A method for measuring the refractive index of a substance, comprising the steps of:

- (a) disposing the substance between a first lens and a second lens;
- (b) passing light from the first lens to the second lens through the substance;
- (c) measuring the beam width of the light exiting the second lens; and
- (d) **estimating outputting a signal representative of an estimated value for the refractive index of the substance, the estimated value being generated** from the measured beam width and a relationship between refractive index and beam width.

Claim 28 (currently amended): The method of claim 27 wherein **[[and]]** the substance is in liquid form.

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Claim 29 (original): The method of claim 27 wherein step (a) comprises the steps of disposing the substance in liquid form between the lenses, and thereafter converting the substance to a solid form.

Claim 30 (currently amended): The method of claim 27 further comprising **[[of]]** the step of heating the substance during steps (b) and (c) to one or more temperatures above room temperature.

Claim 31 (currently amended): The method of claim 27 further comprising **[[of]]** the step of cooling the substance during steps (b) and (c).

Claim 32 (currently amended): The method of claim 27 further comprising **[[of]]** the step of applying an electric field to the substance during steps (b) and (c).

Claim 33 (currently amended): The method of claim 27 further comprising **[[of]]** the step of applying a magnetic field to the substance during steps (b) and (c).

Claim 34 (currently amended): The method of claim 27 ~~for the~~ further comprising the step of varying the wavelength of the light during steps (b) and (c).

Claim 35 (original): The method of claim 27 wherein the first lens comprises a planar spreading lens formed on a substrate, and wherein the second lens comprises a planar converging lens formed on said substrate.

Claim 36 (original): The method of claim 27, wherein the light exiting the second lens has a converging section and a diverging section, the converging section being closer to the second lens than the diverging section, and wherein step (c) comprises measuring the beam width of the exiting light in the diverging section.

Claims 37-45: (canceled)